

NASA AMES RESEARCH CENTER SELF-GUIDED TOUR OF PRIMARY FACILITIES



AMES RESEARCH CENTER,
LOCATED AT THE SOUTH END OF THE SAN FRANCISCO BAY

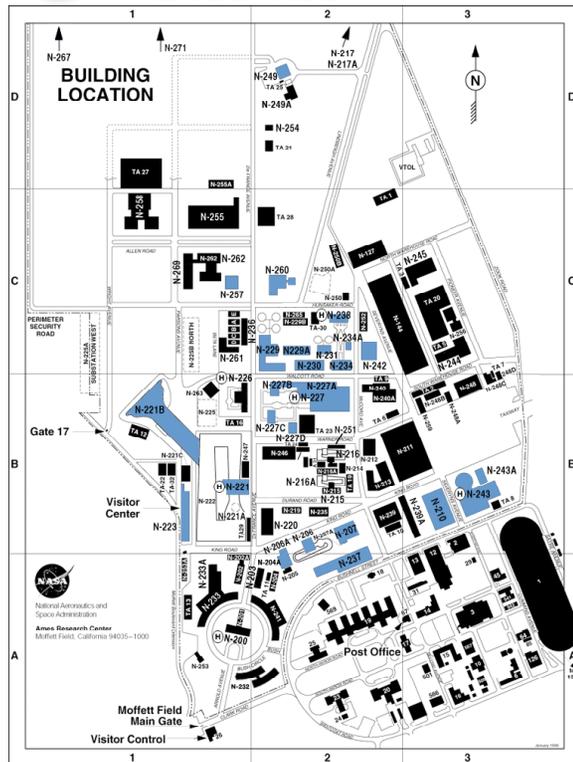
HISTORIC PRESERVATION OFFICE
FALL 2011

The Ames campus is a secure federal facility that is not open to the general public. Only individuals already possessing appropriate authorization may tour the campus in person.

NASA AMES RESEARCH CENTER SELF-GUIDED TOUR OF PRIMARY FACILITIES

A

FACILITIES IN CODE A: OFFICE OF THE DIRECTOR OF AEROSPACE



SPACE TECHNOLOGY BUILDING, N-204A



This facility conducts research and development (R&D) on arc jets and thermal protection systems that enable hypervelocity flight in planetary atmospheres. Such R&D was essential for

the Apollo, Shuttle, and Galileo Probe vehicles. Advances in thermal protection also support the ongoing exploration of Mars and the outer planets, as well as the development of reusable launch vehicles (e.g., the X-33 experimental aircraft). Also under development is aerobraking and advanced regenerative life support technology to permit human exploration of Mars without the need for new, larger launch vehicles.

Other R&D at this facility includes sensor development, particularly in the infrared, and the application of information technology in intelligent systems, integrated design systems, computational fluid dynamics, and nanotechnology for electronics.



FLIGHT SYSTEMS RESEARCH LABORATORY, N-210

The Flight Systems Research Laboratory contains offices and

computer laboratories for developing air traffic management automation tools and rotorcraft flight performance analysis software. The computer labs contain high-performance computer workstations in systems furniture to provide an interactive environment for software development and scientific analysis. At the north end of the building there is a high bay that is used for storage. The work conducted in the Flight Systems Research Laboratory is the core of NASA's contribution to the fields of airspace operations.



ELECTRIC ARC SHOCK TUBE EAST, N-229

The Electric Arc Shock Tube is used for basic science research on flow phenomena at

hypervelocity speeds. The electric arc-driven shock tube facility consists of one driver system and two parallel-driven tubes. The driver can be operated in a variety of configurations depending on test requirements. The energy to the driver is supplied by a capacitor energy storage system consisting of 220 capacitors. By using different combinations of series-parallel connections, the capacitance of the bank can be varied. This facility contains two large (5,500-horsepower) reciprocating compressors, as well as all of the auxiliary equipment required to operate the compressors. Included in N-229 is the control room for distribution of high-pressure air across the center, a mechanic shop, a switchgear room, a welding shop, and a boiler room.



PHYSICAL SCIENCES RESEARCH LABORATORY, N-230

This facility houses the Photophysics, Materials Research, and ISP Sensor Development Laboratories.

The Photophysics Laboratory includes two laser-application laboratories for spectroscopic research and optical instrumentation development, a small supersonic wind tunnel facility for the demonstration of laser diagnostic techniques in

high-speed flows, and a large stratosphere-simulation vacuum chamber where laser diagnostic methods were developed for use during space shuttle flight. The lab's high-energy pulsed lasers include ultraviolet excimer gas lasers, multi-wavelength Nd:YAG (neodymium – yttrium, aluminum, and garnet) lasers, and tunable dye lasers.

Research at the Materials Research Laboratory includes an investigation of graphite-epoxy composites and metal matrix composites. The laboratory's hydraulic testing machines are used for mechanical experiments on composite materials used in aeronautic applications.

The ISP Sensor Development Laboratory supports the manufacture of heat flux gauges approximately 0.5 inch in diameter and 0.022 inch thick, used in the Arc Jet Facility, Building N-234. To produce the gauges, screen-printed sensors are fired in a furnace to 1550° Celsius to eliminate organics and achieve a solid metal film. The laboratory is used for material inspections and calibration. The calibration process involves repeated temperature steps of up to 1100° Celsius.



HYPERVELOCITY FREE-FLIGHT FACILITY, N-237

The Hypervelocity Free-Flight Facilities provide a unique suite of testing capabilities to study the aerodynamics of hypervelocity flight, atmospheric entry, and the response of materials to hypervelocity impact. The HFFF comprise two ballistic ranges: the

Aerodynamic (HFFAF) and the Gun Development (HFFGDF).

The HFFAF is NASA's only Aeroballistic Range and consists of a model launching gun, a sabot separation tank/vacuum chamber, a test section with 16 orthogonal photo stations, a test cabin, and the largest combustion-driven shock tube in the United States. This multifaceted facility can be configured to perform shock tunnel testing, aeroballistic testing, counterflow aeroballistic testing, or hypervelocity impact testing. The 22.9-meter (75-ft) long test section can be filled with various gases to simulate flight in planetary atmospheres. The 40.6-cm (16-in) diameter shock tube is capable of producing high-enthalpy airflow at Mach 7. This flow may be used for fixed-model testing or as a counter-current to the gun-launched models for combined velocities up to 11 km/s (36,000 ft/sec).

The HFFGDF consists of a model launching gun, a sabot separation tank/vacuum chamber, a flight tube, and an impact chamber. This facility is primarily used to expand and enhance the performance characteristics of the model launching guns used in the HFFF. This range can also be used to perform hypervelocity impact studies to simulate micro-meteoroid and orbital debris impact.

Both ranges were constructed in 1964 and utilize an arsenal of light-gas and powder guns to accelerate particles that range in size from 3.2 to 25.4 mm (0.125 to 1 inch) in diameter to velocities ranging from 0.5 to 8.5 km/s (1,500 to 28,000 ft/s).

H ARC JET COMPLEX, N-238, N-234, N-234A AND N-231



The Ames Arc Jet Complex has a rich heritage of over 40 years in Thermal Protection System (TPS) development for every NASA Space

Transportation and Planetary program, including Apollo, Space Shuttle, Viking, Pioneer-Venus, Galileo, NASP, Mars Pathfinder, Stardust, Mars Exploration Rovers, X-33, X-34, SHARP-B1 and B2, X-37, Phoenix, Mars Science Laboratory, and Orion. This TPS history includes a long heritage in the development of the arc jet facilities. The Ames arc jets are designed to produce hypersonic test conditions representative of the high velocity, high altitude portions of an entry trajectory. These are used to simulate the aerothermal heating and forces that develop on the heat shields, leading edges, and other areas of the spacecraft requiring thermal protection during hypervelocity passage through planetary atmospheres. TPS samples run in the arc jets from a few minutes to over an hour, from one exposure to multiple exposures of the same sample, in order to understand and improve the TPS response to a hypersonic flow aerothermal environment. The Ames Arc Jet Complex is a key enabler for customers involved in TPS design, development, test, and evaluation. Arc jet data is critical for validating TPS thermal models, heat shield design, instrumentation, and repair techniques, and for supporting flight qualification and sustaining engineering requirements.



H **FLIGHT AND GUIDANCE SIMULATION LABORATORY, N-243 AND N-243A**
The Vertical Motion Simulator (VMS)

enables scientists to conduct advanced research in a unique flight simulation complex. The facility provides researchers with exceptional tools to explore, define, and solve issues in both aircraft and spacecraft design. It offers fast and cost-effective solutions using real-time piloted simulation, realistic sensory cues, and the greatest motion range of any flight simulator in the world. The Vertical Motion Simulator is integrated with FutureFlight Central (FFC) and the Crew-Vehicle Systems Research Facility (CVSRF) to provide simultaneous cockpit and air traffic control perspectives. This unique capability enables systems-level analyses of concepts across multiple domains and creates the building blocks for simulating the myriad operations encompassed within the national airspace system.

At the VMS, flexibility in both hardware and software allows any type of vehicle to be simulated and evaluated, whether existing or conceptual. Existing vehicles simulated include airships, helicopters, fighter jets, and the Space Shuttle Orbiter. Conceptual vehicles simulated include Tilt-Rotor, Tilt-Wing, High-Speed Civil Transports, and Advanced VSTOL aircraft. The VMS is also an important resource for simulating next-generation space transportation vehicles.



CREW-VEHICLE SYSTEMS RESEARCH FACILITY, N-257
The Crew-Vehicle Systems Research Facility (CVSRF) is an

unparalleled national resource that supports NASA, the FAA, and many industry research programs. Designed to provide researchers with an environment where they can study how and why aviation errors occur, CVSRF stands out in the area of human factors research. CVSRF offers researchers a suite of simulation facilities and utilities that can be used to analyze flight crew performance and to develop and improve new simulation and training tools.

CVSRF houses several simulators capable of full-mission simulation. The ability to conduct high-fidelity, full-mission simulations transforms the experience for the pilot and flight crew from one of simply flying the isolated aircraft to a more realistic, fully interactive process in which the crew can engage in "gate-to-gate" procedures and communications with a variety of air traffic controllers and scenarios. CVSRF's capacity to perform such high-fidelity simulations is unique in the world. An additional attribute of this facility is its high-level architecture, which allows the facility to tie in to other simulations around the country to simulate civil and military operations in the national airspace. Locally, CVSRF is connected to the Vertical Motion Simulator and FutureFlight Central.



FLUID MECHANICS LABORATORY, N-260
An entirely new Computational Fluid Dynamics (CFD) method for predicting

hover performance was developed in this facility. This computational fluid dynamics method is the first to predict the freely convecting wake system of a hovering rotor without any numerical dissipation errors. As a result, it is now possible to routinely analyze the hover characteristics of highly innovative rotor designs.



3.5-FOOT HYPERSONIC WIND TUNNEL AUXILIARIES, N-229A

This facility contains two large (5,500-horsepower) reciprocating compressors, as well as all of the auxiliary equipment required to operate the compressors. Included in N-229A is the control room for distribution of high-pressure air across the center, a mechanic shop, a switchgear room, a welding shop, and a boiler room.



RESEARCH AND DEVELOPMENT RESEARCH SUPPORT FACILITY, N-223

This facility supports materials development for thermal protection systems and plasma experiments.



MARS UNIT, N-242

This facility supports testing in a small wind tunnel simulating surface conditions on Mars. It also houses production of thermal

protection tiles primarily used in support of the arc jet facility.



OUTDOOR AERODYNAMIC RESEARCH FACILITY, N-249

Originally built in 1969 and upgraded in 1994, the Outdoor Aerodynamic Research

Facility is currently mothballed. It was used for static testing of V/STOL models and rotary wing models, for acoustic testing, and for the analysis of aircraft models prior to testing in the 40x80-foot or 80x120-foot wind tunnels.

The Outdoor Aerodynamic Research Facility consists of an open-air test facility with a model mounting test pad, data acquisition equipment, control room, and other necessary support equipment for remote model or aircraft operation.



12-FOOT PRESSURE WIND TUNNEL, N-206 AND N-206A

Restored in 1994, this tunnel was the only large-scale, pressurized, low

turbulence, subsonic wind tunnel in the United States. It provided unique high-Reynolds number testing capabilities for the development of high-lift systems on commercial transport and military aircraft, and for high angle-of-attack testing of maneuvering aircraft. This facility was closed in 2003 due to budgetary constraints.



BALANCE CALIBRATION LABORATORY, N-207

Operations at this lab include calibrating balances for the wind

tunnels at Ames, as well as for outside projects. Ames recently finished modifications on the Automated Balance Calibration Machine. The lab's current inventory of machine-to-balance adapters can accommodate 6.4- to 10-centimeter (2.5- to 4-inch) balances. Work is currently in progress to accommodate single-piece balance configurations, as well as smaller TASK balances. The machine is a unique tool-in-wind tunnel balance calibration technology. It can generate simultaneous combinations of three forces and three moments within its load envelope. Without the physical limitations of dead-weight manual loading, the Automated Balance Calibration Machine can be used to bring calibration load schedules closer to real tunnel load conditions, thus increasing the accuracy of the calibration.



H NATIONAL FULL-SCALE AERODYNAMIC COMPLEX, N-221 AND N-221B

The National Full-Scale Aerodynamics Complex

(NFAC) is the largest wind tunnel complex in the world and consists of the 40x80-foot Wind Tunnel, 80x120-foot Wind Tunnel, and Outdoor Aerodynamic Research Facility. The National Full-Scale Aerodynamics Complex has been used to determine the low- and medium-speed aerodynamic characteristics of high-performance aircraft, rotorcraft, and fixed wing, powered-lift V/STOL aircraft. Operated and used by NASA, the NFAC has also been used by industry, the Department of Defense, and other government agencies. The 40x80-foot wind tunnel has been entered into the National Register of Historic Places. This facility is currently under lease to Arnold Air Force Base.



H UNITARY PLAN WIND TUNNEL, N-227 AND N-227A-D

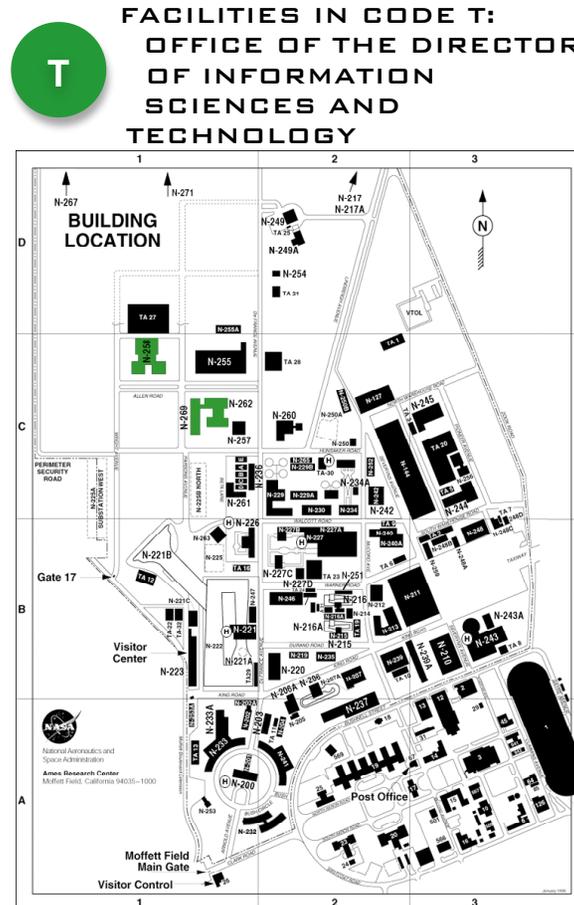
The Unitary Plan Wind Tunnel complex has been a critical

contributor in making the United States the leader in aerospace since its commissioning in 1956. This complex is where generations of commercial, military and advanced concept aircraft as well as NASA space vehicles, including the space shuttle, have been designed and tested. Every major commercial transport and almost every fighter built

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in the United States over the last 50 years has been tested in these tunnels. In addition, a number of conceptual as well as final design models of the Space Shuttle and of the Mercury, Gemini, and Apollo capsules were tested here. In 1985, the Unitary Plan Wind Tunnel facility was designated as a National Historic Landmark by the National Park Service because of "its significant associations with the development of the American Space Program." The Unitary Plan Wind Tunnel facility is the most heavily used wind tunnel in all of NASA. Currently, there are two operational wind tunnels in this complex.

A key aspect of this facility is the interchangeability of models among the Unitary test sections to allow testing across a wide range of conditions from Mach 0.2 to Mach 2.5 between the two operating tunnels. The 11x11-foot Transonic Wind Tunnel is a closed-return, variable-density tunnel with a fixed-geometry, ventilated test section, with evenly distributed slots on all four walls, and a dual-jack flexible nozzle. It is one of two separate tunnel circuits powered by a common drive system. The 9x7-foot Supersonic Wind Tunnel has also been used extensively in the development of virtually every domestic fixed wing airframe that operates in supersonic regimes and has played a critical role in space exploration. This facility has provided ascent and reentry aerodynamic data for every NASA-designed, manned space-flight program, including the Space Shuttle. The facility has performed testing of parachutes for future unmanned probes to Mars and like the 11-foot has been used for extensive launch abort tests among others for the NASA's current manned space flight efforts.



**NASA ADVANCED
SUPERCOMPUTING
FACILITY, N-258**
The NASA Advanced Supercomputing (NAS) Division provides NASA's primary high end computing (HEC)

capability, operating powerful supercomputers, massive data storage systems, and high-speed networking to support a vast array of large computations needed to advance the Agency's missions of science, aeronautics research, and space exploration. This includes the modeling, simulation, analysis, and decision support activities for all of NASA's four mission directorates. The goal is to develop and deliver the most productive high-end computing environment in the world, enabling NASA to extend technology, expand knowledge, and explore the universe. The NAS Division, known worldwide for its innovation and expertise in HEC, was built in 1986, following a long history of computing leadership at Ames extending back to the early 1950s.

NAS HEC operations include a comprehensive set of user services to ensure that resources are effectively utilized by modeling and simulation experts from NASA centers, academia, and industry across the nation and around the clock. A 24x7 control room responds immediately to user issues and ensures that HEC systems remain fully and continuously operational. Application experts resolve complex problems and enhance the performance of computational modeling, simulation, and analysis applications. To assist users in interpreting the massive and complex data sets resulting from computations, a visualization and data analysis team

develops application-driven software tools and pioneered hyperwall and concurrent visualization capabilities. Supercomputing and data system administrators continuously customize and optimize system configurations to ensure that even the most demanding requirements can be met. And finally, end-to-end networking services enable application scientists and engineers from geographically dispersed locations to efficiently access computational resources and quickly transfer massive datasets.



HUMAN PERFORMANCE RESEARCH LABORATORY, N-262

Research at the Human Performance Research Laboratory focuses on

human performance and automation in aerospace systems. Areas of study include human vision, audition, attention, motor control, fatigue, human factors maintenance, communication, team problem-solving, training, human workload, control theory, virtual reality, and virtual environments. Areas of development include: (1) computational models of human perceptual, cognitive, and decision systems; (2) perceptual optimization of visual displays and imaging systems; (3) three-dimensional auditory displays; (4) machine vision algorithms for autonomous vehicle control; (5) advanced human-centered IT; and (6) human factors expertise to address high-priority aerospace challenges.

Also in N-262 is NASA's FutureFlight Central (FFC), a national Air Traffic Control/Air Traffic Management (ATC/ATM) simulation facility dedicated to solving

the present and emerging capacity problems of the nation's airports. The two-story facility offers a 360-degree full-scale, real-time simulation of an airport, where controllers, pilots and airport personnel interact to optimize expansion plans and operating procedures, and to evaluate new technologies. The physical structure of FFC is fully customizable so that any air traffic tower in the world can be realistically simulated. The facility has established a precedent for enabling stakeholders to achieve consensus through a common vision of the future. FFC can be linked to other high-fidelity simulators via a high level architecture and is locally connected to the Vertical Motion Simulator and the Crew-Vehicle Systems Research Facility.

In addition to simulating airports, FFC is configured to serve as a visualization tool. The 360-degree field of view can depict any scenario desired, be it UAS operations in the Middle East, the plains of Mars, or the deep sea canyons off the Monterey Coast. This powerful capability provides researchers with a fully immersive experience that allows them to explore new concepts and procedures in their area of interest.



AUTOMATION SCIENCES RESEARCH FACILITY, N-269

The Automation Sciences Research Facility provides an integrated environment

for investigating the interaction between humans and highly automated systems. Within the Automation Sciences Research Facility, the neuro-engineering library is used to support intelligent

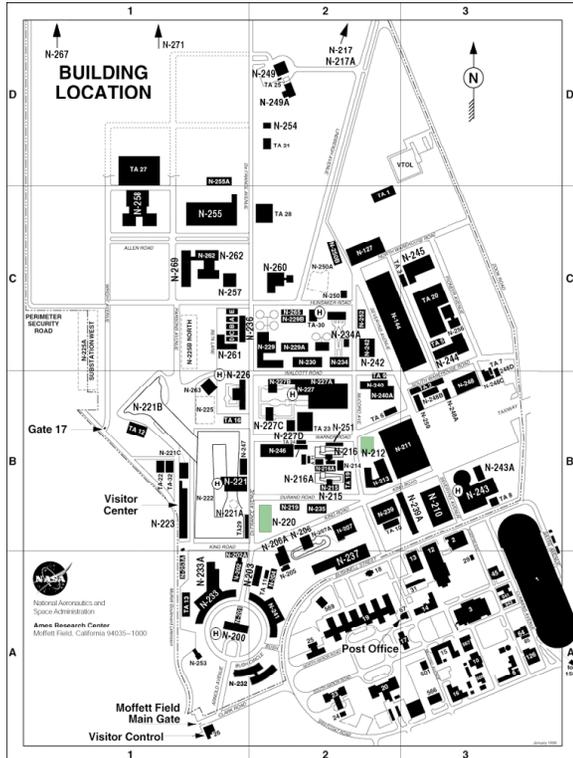
flight control (neural networks applied to flight systems). The DARWIN testbed connects the wind tunnels with the aircraft manufacturers for better design and testing control and result dissemination. The intelligent mechanism lab has been the site of several field missions demonstrating remote/telecontrol and presence. The photonics lab supports the study of bacteriorhodopsin for optical processing.

N-269 also houses the Future Flight Central facility, administered by Code A. The Future Flight Central facility provides a 360-degree view/simulation of an air traffic control tower. Examples of current projects at this facility include: (1) implementation of terrain mapping visualization systems for remotely operated vehicles; (2) acquisition, processing, and visualization of acoustic data in wind tunnel tests; and (3) investigation of bacteriorhodopsin (an experimental protein) as an optical processing and sensing medium.

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P

FACILITIES IN CODE P: OFFICE OF THE DIRECTOR OF PROGRAM AND PROJECT DEVELOPMENT



TECHNICAL SERVICES, N-220

The Development Machining and Electromechanical Instrumentation Branch, in Building N-

220, is a branch of the Aeronautics and Space Flight

Hardware Development Division. Machining, instrumentation, mechanical inspection, electronic, and CAD/CAM services are performed at this facility. This facility primarily develops prototype hardware for the Ames research community, including experimental scientific apparatus for shuttle or airborne missions, aerospace wind tunnel models, facility modifications, and biosensors. The personnel at this facility consist of highly skilled engineering technicians that assist with designs and perform all fabrication on very complex scientific instruments and models.

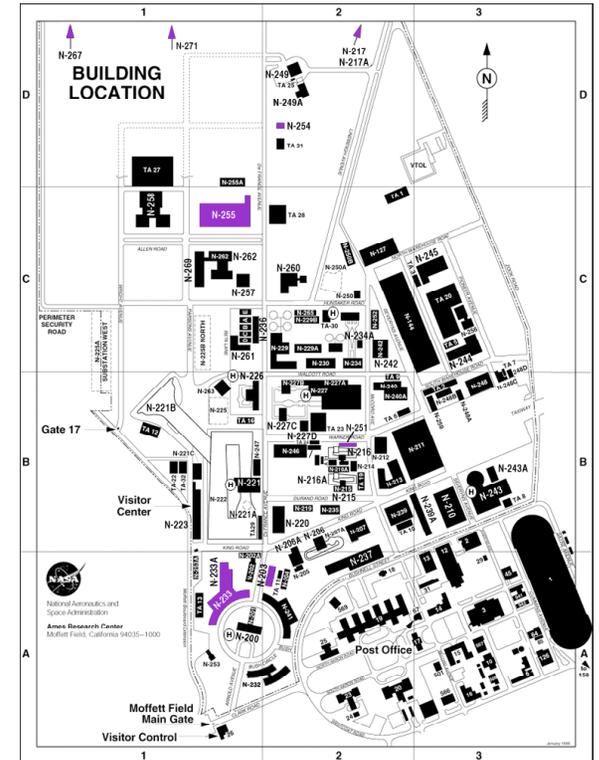


MODEL DEVELOPMENT, ADVANCED COMPOSITES GROUP, N-212

This facility houses the Advanced Composites Group. The Advanced Composites Group is a technical support group for all research disciplines at Ames. Its capabilities include composite fabrication, plastic fabrication, and other non-metallic fabrication processes. The Advanced Composites Group contributes to the design and manufacturing of a wide variety of test equipment and models. The Advanced Composites Group's expertise with many materials and processes has made this facility vital to the success of many high profile projects at Ames. This facility contains spray booths for finish applications, autoclaves for composite fabrication, and many machine tools.

J

FACILITIES IN CODE J: OFFICE OF THE DIRECTOR OF CENTER OPERATIONS



IMAGING TECHNOLOGY LABORATORY, N-203

This facility contained offices and laboratories for the processing of color (AR-5), and black and white aerial film for the Airborne Remote Sensing Research Program. Four

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persons operate and maintain the 1811 and 11CM Versamat film processors located on the second floor, and the effluent treatment plant located in the basement. Photo processing no longer takes place within this facility. The facility currently houses administrative support staff for center.



MAGNETIC STANDARDS LABORATORY AND TEST FACILITY, N-217 AND N-217A

Two magnetic test facilities are located in buildings N-217 and N-217A. They were used infrequently during the late 1990s and were being considered for closure in 2000. The 3.7 meter (12-foot) facility located in building N-217 is designed to calibrate magnetic sensor systems, determine magnetic cleanliness, and measure low-frequency electromagnetic radiation of items not exceeding 1 meter (3.3 feet) in any dimension. The 6-meter (20-foot) coil facility, located in N-217A, was built to accommodate testing of items that are too large for the 3.7-meter (12-foot) facility. In addition to the capabilities of the 3.7-meter (12-foot) facility, the 6-meter (20-foot) facility can duplicate the strength and direction of the earth's magnetic field anywhere on earth, in earth orbit, or in deep space. The ambient field in the working area of the coils can be canceled to permit engineering or biological studies in near-zero field. Noninvasive measurements of the magnetic field produced by the human heart, for example, were performed in this facility. This facility has measurement sensitivities of less than 1 microgauss.



CENTRAL COMPUTER FACILITY, N-233 AND N-233A

The Central Computer Facility houses the computer and networking systems that provide the basic

IT infrastructure for the day-to-day operation of ARC. Included in this suite of systems are a large number of UNIX-based servers that provide the center's email and messaging services, the internal (intranet) web sites, and external web sites used for outreach to the public. This facility also houses the Network Operations Center from which the center's ARCLAN campus network is managed and operated, along with its related server systems and user help desk. The Central Computer Facility also houses the center's business data processing and database systems, which support personnel and financial resource management functions throughout the center. The N-233A wing of this facility houses an archival data storage system used by the Numerical Aerospace Simulation Supercomputer Facility (located in N-258). This storage system utilizes robotic magnetic tape storage "silos" to provide very high-capacity file storage for their R&D users. This storage system is linked to the N-258 supercomputers via a high-speed fiber optic communications system. In addition, N-233A also houses an IT systems development and integration laboratory supporting the activities of the Central Computer Facility (Code JT) and the Code I advanced computer networking projects.



MOTOR POOL, N-251

The Motor Pool contains facilities for the management of the center's transportation needs. It includes a fuel station, offices, equipment repair bays, vehicle wash area, and parking areas for conducting the operation, maintenance, and repair of the diverse vehicular fleet.



TELECOMMUNICATIONS FACILITY N-254

This facility houses office space and telecommunications equipment. It originally

had an area of 7,967 square feet. A 2,000-square foot addition was constructed in 2003.



FACILITY SUPPLY SUPPORT CENTER N-255

This 81,639-square foot building houses the postal and supplies operations for Ames Research Center.



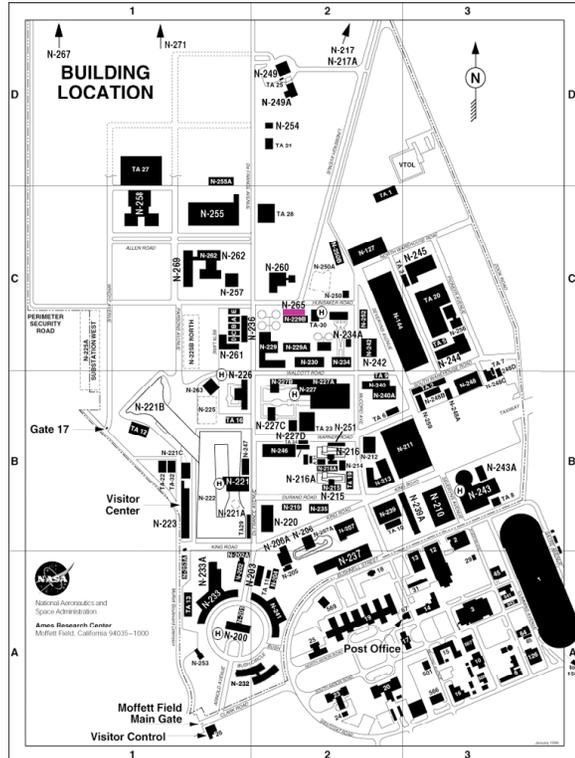
DISASTER AREA RELIEF TEAM, N-267

This 6,367-square foot building houses the Disaster Area Relief Team (DART) facilities.

Training and exercise drills are conducted here.

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FACILITIES IN CODE Q: OFFICE OF THE DIRECTOR OF SAFETY, ENVIRONMENTAL, AND MISSION ASSURANCE



HAZARDOUS SUBSTANCES TRANSFER SITE, N-265

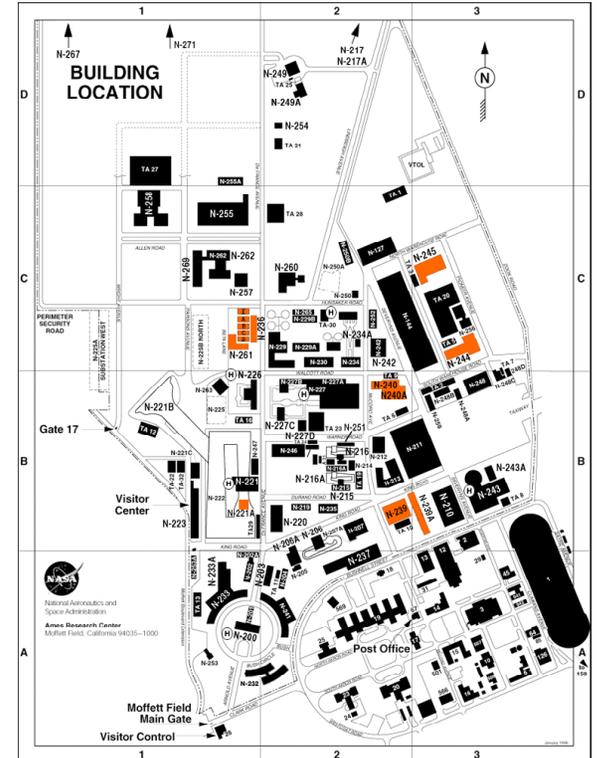
This facility serves as an accumulation and packaging area for hazardous wastes generated at various locations throughout the center. Hazardous wastes are accumulated and packaged in areas segregated by hazard class and type.



INDUSTRIAL WASTEWATER TREATMENT PRE- TREATMENT PLANT, N-271

The Industrial Wastewater Pre-treatment Plant was constructed to remove metals and dissolved solids from industrial wastewater and from groundwater, enabling treated effluent to be used as makeup water in the boiler for the Arc Jet Facility and in the Unitary Plan Wind Tunnel cooling tower. Treatment and reuse of the center's industrial wastewater, and use of treated groundwater, lessen the demand for San Francisco Water Department potable supply, as well as substantially decreasing discharges to the Palo Alto Regional Water Quality Control Plant and Stevens Creek.

FACILITIES IN CODE S: OFFICE OF THE DIRECTOR OF ASTROBIOLOGY AND SPACE RESEARCH



20-G CENTRIFUGE, N-221A

The 20-G Centrifuge is 17.7 meters (58 feet) in diameter and can be used to evaluate flight hardware as well as to test the effects of hyper-

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gravity on humans, other animals, and plants. Mounted on the centrifuge are three enclosed cabs. Cab A, mounted at one end of the rotating arm, contains a modified jet fighter ejection seat in which a human volunteer sits during tests. Cab B, at the other end of the rotating arm, contains a swing frame often used for non-human subjects or can be configured to meet an investigator's needs. Cab C, located near the center of the arm (the center of rotation), can also be adapted to an investigator's needs or can be used either as a near-center control for angular velocity or to study the effects of gravity gradients. The 20-G Centrifuge is capable of producing forces up to 20 times that of terrestrial gravity. During centrifuge operations, a combination of 47 control and 56 instrumentation slip rings allows control of onboard experiments from the control room and communication between control room operators and onboard subjects. The centrifuge speed is computer-controlled, allowing for the development of preprogrammed gravity profiles. A programmable logic controller monitors all critical mechanical and electrical systems to ensure that the systems are within design specification limits.



BIOSCIENCES LABORATORY, N-236 AND N-236A-E

The Biosciences Laboratory is used for biomedical research and animal care.



LIFE SCIENCES RESEARCH LABORATORY, N-239 AND N-239A

The Life Sciences Research Laboratory contains the human environmental test facility and environmental chamber. Research conducted at this facility includes, biomedical, extraterrestrial research, ecosystem science, closed ecological life-support systems (CELSS), nanotechnology research, and search for extraterrestrial intelligence (SETI). Some laboratories in this facility are operated by Code A personnel.



CENTER FOR ENGINEERING INNOVATION, N-240 AND N-240A

The Center for Engineering Innovation is occupied by the Life Sciences Division offices, the C-130 Data Facility, and the wet chemistry lab. This facility contains offices and laboratories supporting the NASA Space Station Biological Research Payload Office, which performs planning, testing, and hardware integration for life sciences payloads. Biology laboratories and a high-bay test area are used for experiment verification tests in which payload experiments are performed by the experiment science teams and space lab crew using flight hardware, ground operations procedures, and space-lab crew procedures. Flight hardware is prepared and shipped from this site to Kennedy Space Center. The wet chemistry laboratory houses a wide variety of testing equipment for

environmental testing. The wet chemistry laboratory is equipped with thermogravimetric analysis and digital scanning calorimetry capabilities for materials characterization. Projects of interest that have been conducted by the materials group in the area of wet chemistry include hygrothermal analysis of composite specimens and exposure testing of aluminum.



VESTIBULAR RESEARCH FACILITY, N-242

The Vestibular Research Facility contains state-of-the-art equipment for ground-based studies of vestibular function (which affects one's sense of balance). This facility hardware enables the study of responses to smooth, linear motion, or to combinations of linear and angular motion over the frequency range of natural head movement.

The Vestibular Research Facility permits the study of how complex linear and/or rotational accelerations are transduced, encoded by the vestibular system, and processed by the brain. Interactions between linear and angular vestibular stimuli, and visual and proprioceptive inputs (peripheral, central, and motor), are examined using electrophysiological, reflexive, and behavioral methods.



SPACE PROJECTS FACILITY N-244

The Space Projects Facility contains the offices and laboratories for developing and managing space

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projects. It includes facilities for conducting mission operations and laboratories for developing infrared detectors, cryogenics, control systems, communication systems, data systems, and other support systems and experiments for space projects. It also includes a clean room facility and an environmental test laboratory.



SPACE SCIENCES RESEARCH LABORATORY, N-245

The Space Sciences Research Laboratory is dedicated to research in astrophysics, exobiology, and planetary science. These research programs are structured around the study of origins and evolution of stars, planets, planetary atmospheres, and biological organisms.

The Space Science Division's programs include: (1) the study of interstellar gas and dust that form the raw material for stars, planets, and life, (2) the processes of star and planet formation, (3) the search for planetary systems around other stars, (4) the evolution of planets and their atmospheres, (5) the structure, dynamics, and chemistry of planetary atmospheres, (6) the origin of the biogenic elements and molecules and their distribution in space, (7) the origin of life and its early evolution on Earth, and (8) the search for past or present life throughout the solar system.



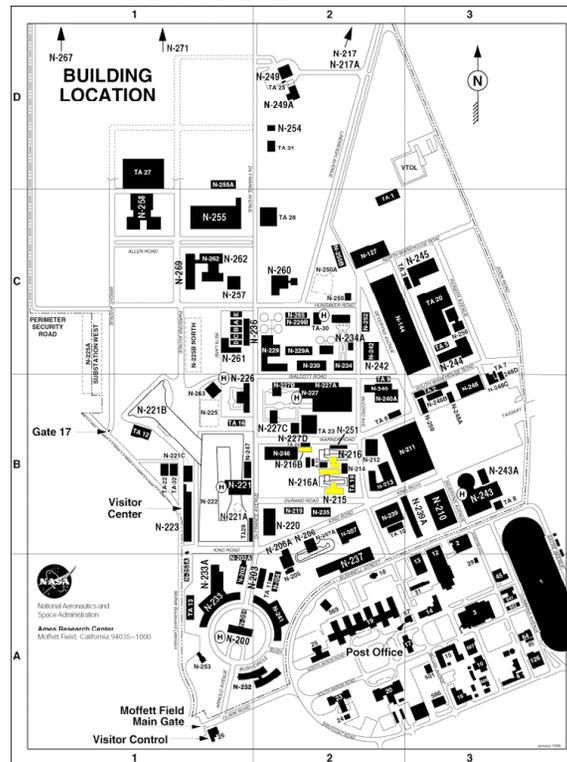
BIOMEDICAL RESEARCH FACILITY, N-261

The Biomedical Research Facility is utilized for neuroscience research.

This facility contains a darkroom, electron microscopy facilities, computer areas, testing booths, and surgery facilities.



FACILITIES IN CODE Y: AEROFLIGHT DYNAMICS DIRECTORATE, U.S. ARMY AVIATION AND MISSILE COMMAND



ARMY AEROMECHANICS LAB AND 7X10-FOOT WIND TUNNELS 1 AND 2, N-215 AND N-216

The tunnels are closed circuit, low speed, and pressurized to 1 atmosphere. Tunnel No. 1 is used for research in support of low-speed aerodynamics, using small-scale aircraft, V/STOL aircraft, and space vehicle reentry body models. Wind speeds within the tunnel are continuously variable up to 402.5 kilometers per hour (250 miles per hour).



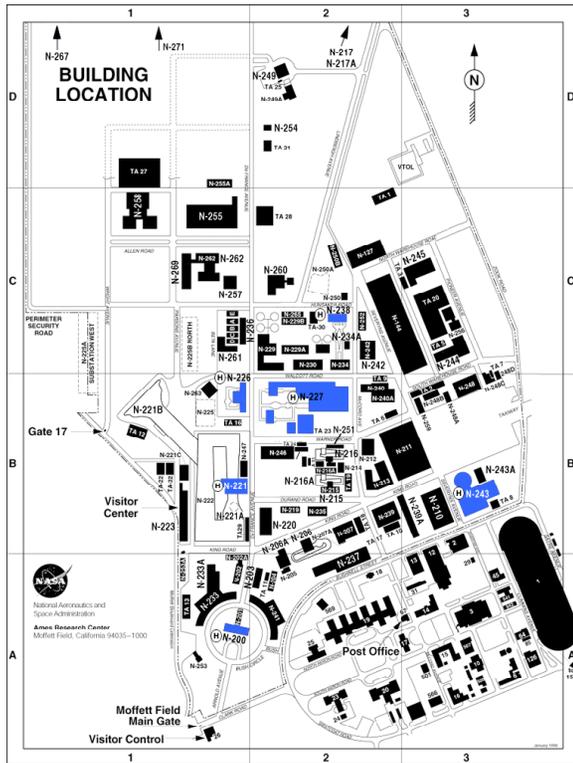
MODEL PREPARATION AREA, N-216A AND B

This area is a shop used in the development of models to be run in the 7x10-foot Wind Tunnel and the development of parts for the tunnel.

NASA AMES RESEARCH CENTER SELF-GUIDED TOUR OF PRIMARY FACILITIES



ADDITIONAL HISTORIC PROPERTIES



Buildings N-226 and N-200 have been reviewed for historic merit and are believed to be eligible for nomination to the National Register of Historic Places.



6X6-FOOT SUPERSONIC WIND TUNNEL, N-226

Building N-226 has been reviewed for historic merit and is believed to be eligible for nomination to the National Register of Historic Places. Building N-226, which houses the 6x6-ft Supersonic Wind Tunnel, is significant at the national level under Criterion 1 (Events) for its direct association with supersonic flight research and for its use as a supersonic wind tunnel testing facility (1948 – 1988). Additionally, this building is significant under Criterion 3 (Design/Construction) as an exceptional engineering accomplishment in the context of wind tunnel construction. Building N-226 played a crucial role in the discovery of supersonic flight research, which subsequently led to improved designs of supersonic aircrafts and missiles. Although the building has been altered in its interior, these alterations do not affect the building's integrity. Thus, this building possesses integrity of location, design, setting, materials, workmanship, feeling, and association.

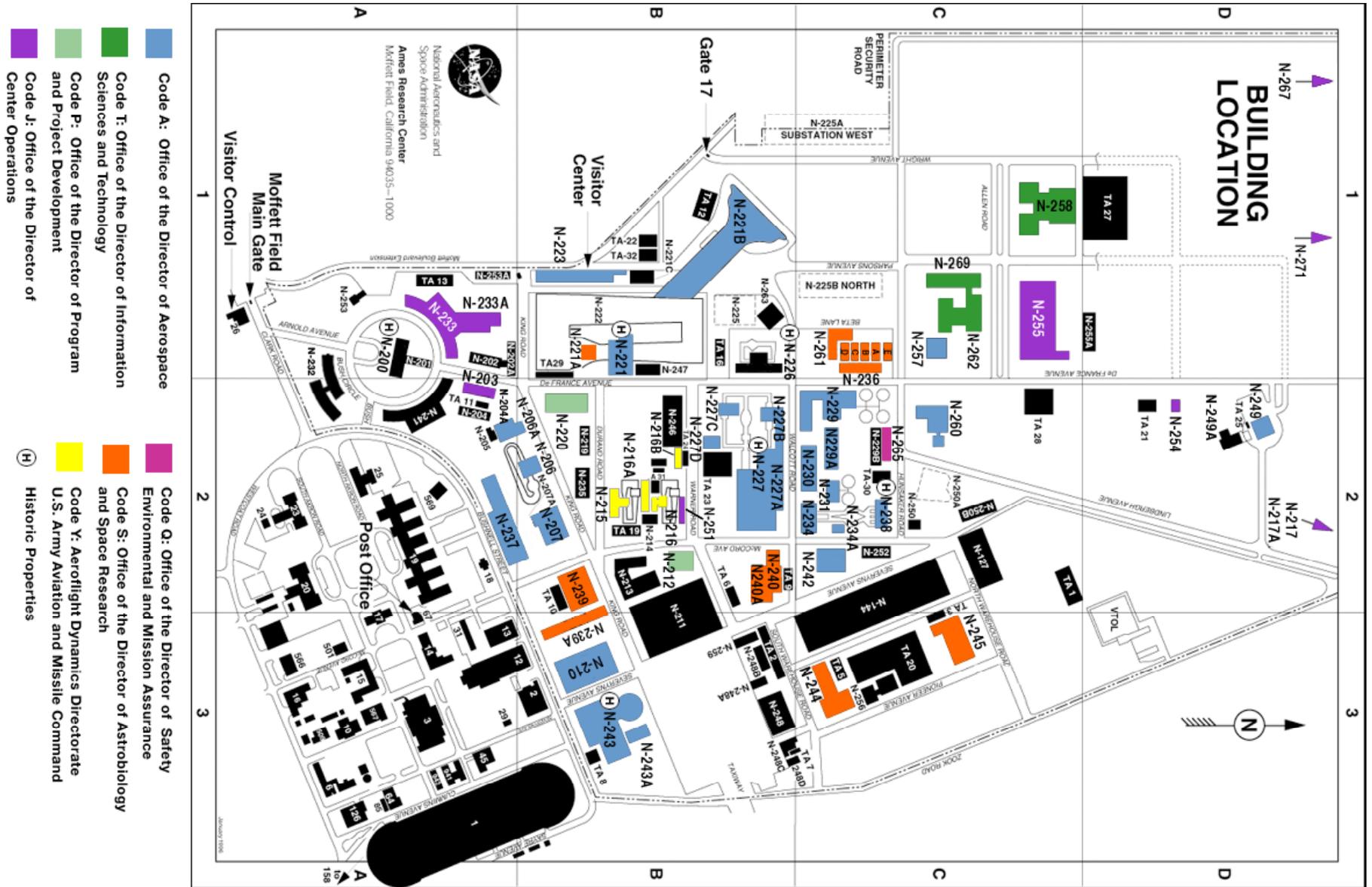
direction of Smith DeFrance, the Ames Research Center's first director, and became the main administration building. It is significant at the national level under National Register Criterion A & B (California Register Criterion 1 & 2) for its use as the Ames Aeronautical Laboratory Administration Building (1942 – 1958) and later as the Ames Research Center Administration Building (1959 – Present). It was originally constructed to house all administrative and office activities at the center, including the offices of the Director and Assistant Director, Center Management, Personnel, Procurement, and Central Files. Additionally, the building was the original home to several research divisions, the library, and cafeteria. This building is significant in the areas of space exploration and settlement (1943 – Present) and in the areas of science and invention. Additionally, the building is significant for its association with Smith DeFrance, H. Julian Allen, John F. Parsons, and Harry J. Goett. Although the interior has been largely altered and there have been several exterior renovations (i.e., the addition of an elevation tower and canopy), Building N-200 still retains qualities that convey its historical significance. This building possesses integrity of location, design, setting, materials, workmanship, feeling, and association.



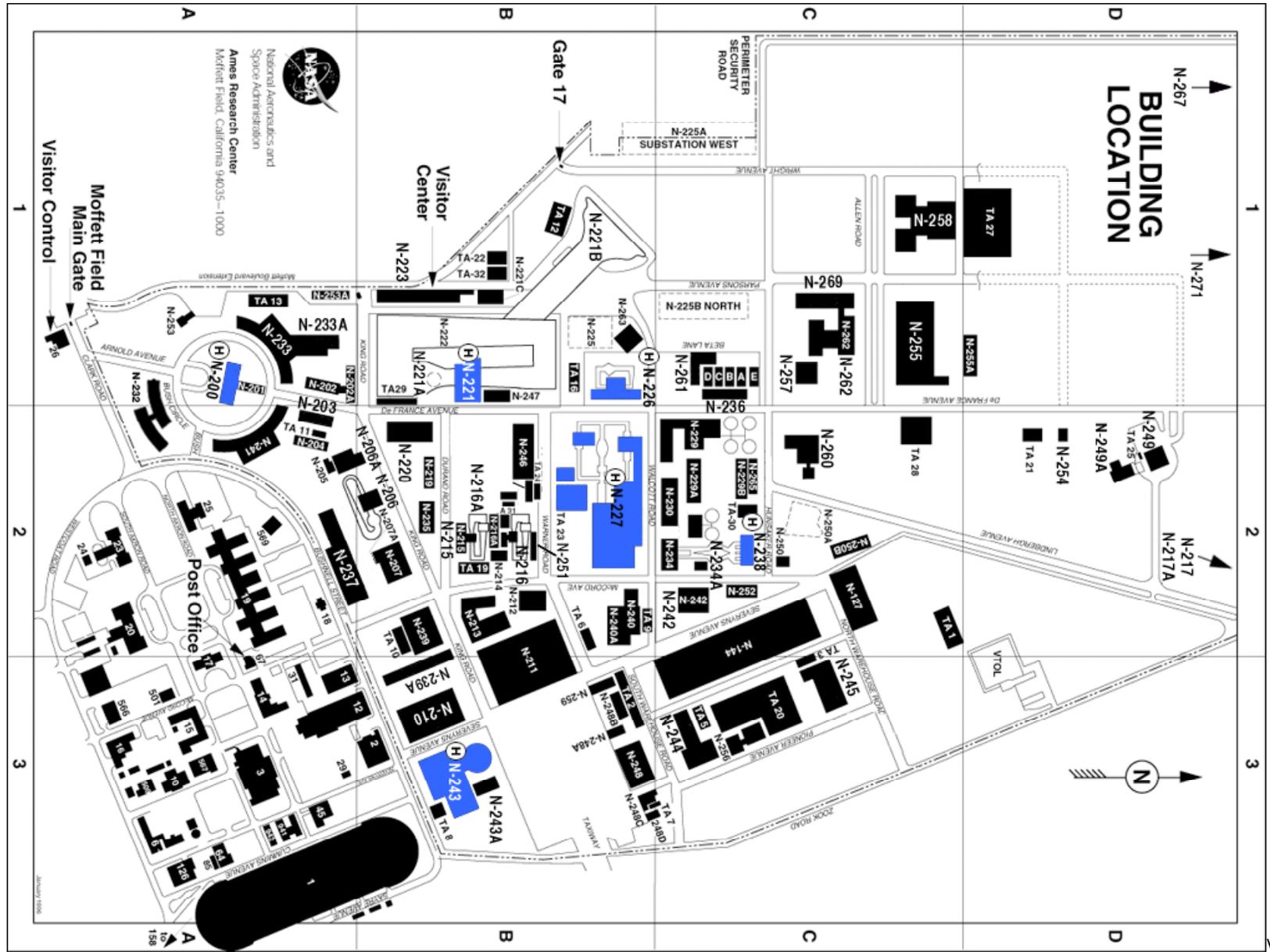
ADMINISTRATION BUILDING, N-200

Building N-200 has been reviewed for historic merit and is believed to be eligible for nomination to the National Register of Historic Places. Building N-200 was one of the earliest buildings on the NASA Ames Research campus. It was designed under the

NASA AMES RESEARCH CENTER SELF-GUIDED TOUR OF PRIMARY FACILITIES



NASA AMES RESEARCH CENTER SELF-GUIDED TOUR OF PRIMARY FACILITIES



Building Key

ALPHABETICAL BY STATUS AND ORGANIZATION CODE HISTORIC PROPERTIES

6x6-foot Supersonic Wind Tunnel, N-226 (B-1)
Administration Building, N-200 (A-1)
Arc Jet Complex, N-238 (C-2)
Flight and Guidance Simulation Laboratory, N-243 (B-3)
National Full-Scale Aerodynamic Complex, N-221 and N-221B (B-1)
Unitary Plan Wind Tunnel, N-227 and N-227A-D (B-2)

CODE A: OFFICE OF THE DIRECTOR OF AEROSPACE

12-foot Pressure Wind Tunnel, N-206 and N-206A (B-2)
3.5-foot Hypersonic Wind Tunnel Auxiliaries, N-229A (C-2)
Arc Jet Complex, N-238, N-234, N-234A, and N-231 (C-2)
Balance Calibration Laboratory, N-207 (B-2)
Crew-Vehicle Systems Research Facility, N-257 (C-1)
Electric Arc Shock Tube East, N-229 (C-2)
Flight and Guidance Simulation Laboratory, N-243 and N-243A (B-3)
Flight Systems Research Laboratory, N-210 (B-3)
Fluid Mechanics Laboratory, N-260 (C-2)
Hypervelocity Free-Flight Facility, N-237 (A-2)
Mars Unit, N-242 (C-2)
National Full-Scale Aerodynamic Complex, N-221 and N-221B (B-1)
Outdoor Aerodynamic Research Facility, N-249, (D-2)
Physical Sciences Research Laboratory, N-230 (C-2)
Research and Development Research Support Facility, N-223 (B-1)
Space Technology Building, N-204A (A-1)
Unitary Plan Wind Tunnel, N-227 and N-227A-D (B-2)

CODE T: OFFICE OF THE DIRECTOR OF INFORMATION SCIENCES AND TECHNOLOGY

Automation Sciences Research Facility, N-269 (C-1)
Human Performance Research Laboratory, N-262 (C-1)
Numerical Aerodynamic Simulation Facility, N-258 (C-1)

CODE P: OFFICE OF THE DIRECTOR OF PROGRAM AND PROJECT DEVELOPMENT

Model Development, Advanced Composites Group, N-212 (B-2)
Technical Services Facility, N-220 (B-2)

CODE J: OFFICE OF THE DIRECTOR OF CENTER OPERATIONS

Central Computer Facility, N-233 and N-233A (A-1)
Disaster Area Relief Team, N-267, (D-1)
Facility Supply Support Center, N-255 (C-1)
Imaging Technology Laboratory, N-203 (A-2)
Magnetic Standards Laboratory and Test Facility, N-217 and N-217A, (D-2)
Motor Pool, N-251 (B-2)
Telecommunications Facility, N-254, (D-2)

CODE Q: OFFICE OF THE DIRECTOR OF SAFETY, ENVIRONMENTAL, AND MISSION ASSURANCE

Hazardous Substances Transfer Site, N-265 (C-2)
Industrial Wastewater Pre-treatment Plant, N-271 (C-1)

Code S: Office of the Director of Astrobiology and Space Research

20-G Centrifuge Facility, N-221A (B-1)
Biomedical Research Facility, N-261 (C-1)
Biosciences Laboratory, N-236 and N-236A-E (C-1)
Center for Engineering Innovation, N-240 and N-240A (B-2)
Life Sciences Research Laboratory, N-239 and N-239A (B-2) (B-3)
Space Projects Facility, N-244 (C-3)
Space Sciences Research Laboratory, N-245 (C-3)
Vestibular Research Facility, N-242 (C-2)

CODE Y: AEROFIGHT DYNAMICS DIRECTORATE, U.S. ARMY AVIATION AND MISSILE COMMAND

Army Aeromechanics Lab and 7x10-foot Wind Tunnels 1 and 2,
N-215 and N-216 (B-2)
Model Preparation Area, N-216A and N-216B (B-2)

Building Key

ALPHABETICAL

3.5-foot Hypersonic Wind Tunnel Auxiliaries, N-229A, (C-2)

6x6-foot Supersonic Wind Tunnel, N-226, (B-1)

12-foot Pressure Wind Tunnel, N-206 and N-206A, (B-2)

20-G Centrifuge Facility, N-221A, (B-1)

Administration Building, N-200, (A-1)

Arc Jet Complex, N-238, N-234, N-234A, (And N-231, (C-2)

Army Aeromechanics Lab and 7 x 10 foot Wind Tunnels 1 and 2, N-215 and N-216, (B-2)

Automation Sciences Research Facility, N-269, (C-1)

Balance Calibration Laboratory, N-207, (B-2)

Biomedical Research Facility, N-261, (C-1)

Biosciences Laboratory, N-236 and N-236A-E, (C-1)

Center for Engineering Innovation, N-240 and N-240A, (B-2)

Central Computer Facility, N-233 and N-233A, (A-1)

Crew-Vehicle Systems Research Facility, N-257, (C-1)

Disaster Area Relief Team, N-267, (D-1)

Electric Arc Shock Tube East, N-229, (C-2)

Facility Supply Support Center, N-255, (C-1)

Flight and Guidance Simulation Laboratory, N-243 and N-243A, (B-3)

Flight Systems Research Laboratory, N-210, (B-3)

Fluid Mechanics Laboratory, N-260, (C-2)

Hazardous Substances Transfer Site, N-265, (C-2)

Human Performance Research Laboratory, N-262, (C-1)

Hypervelocity Free-Flight Facility, N-237, (A-2)

Imaging Technology Laboratory, N-203, (A-2)

Industrial Wastewater Pre-treatment Plant, N-271, (C-1)

Life Sciences Research Laboratory, N-239 and N-239A, (B-2, (B-3)

Magnetic Standards Laboratory and Test Facility, N-217 and N-217A, (D-2)

Mars Unit, N-242, (C-2)

Model Development, (Advanced Composites Group, N-212, (B-2)

Model Preparation Area, N-216A and N-216B, (B-2)

Motor Pool, N-251, (B-2)

National Full-Scale Aerodynamic Complex, N-221 and N-221B, (B-1)

Numerical Aerodynamic Simulation Facility, N-258, (C-1)

Outdoor Aerodynamic Research Facility, N-249, (D-2)

Physical Sciences Research Laboratory, N-230, (C-2)

Research and Development Research Support Facility, N-223, (B-1)

Space Projects Facility, N-244, (C-3)

Space Sciences Research Laboratory, N-245, (C-3)

Space Technology Building, N-204A, (A-1)

Technical Services Facility, N-220, (B-2)

Telecommunications Facility, N-254, (D-2)

Unitary Plan Wind Tunnel, N-227 and N-227A-D, (B-2)

Vestibular Research Facility, N-242, (C-2)

Building Key

NUMERICAL BY BUILDING NUMBER

N-200, Administration Building, (A-1)	N-236 and N-236A-E, Biosciences Laboratory, (C-1)
N-203, Imaging Technology Laboratory, (A-2)	N-237, Hypervelocity Free-Flight Facility, (A-2)
N-204A, Space Technology Building, (A-1)	N-238, N-234, N-234A, and N-231, Arc Jet Complex, (C-2)
N-206 and N-206A, 12-foot Pressure Wind Tunnel, (B-2)	N-239 and N-239A, Life Sciences Research Laboratory, (B-2), (B-3)
N-207, Balance Calibration Laboratory, (B-2)	N-240 and N-240A, Center for Engineering Innovation, (B-2)
N-210, Flight Systems Research Laboratory, (B-3)	N-242, Mars Unit, (C-2)
N-212, Model Development, Advanced Composites Group, (B-2)	N-242, Vestibular Research Facility, (C-2)
N-215 and N-216, Army Aeromechanics Lab and 7x10-foot Wind Tunnels 1 and 2, (B-2)	N-243 and N-243A, Flight and Guidance Simulation Laboratory, (B-3)
N-216A and N-216B, Model Preparation Area, (B-2)	N-244, Space Projects Facility, (C-3)
N-217 and N-217A, Magnetic Standards Laboratory and Test Facility, (D-2)	N-245, Space Sciences Research Laboratory, (C-3)
N-220, Technical Services Facility, (B-2)	N-249, Outdoor Aerodynamic Research Facility, (D-2)
N-221 and N-221B, National Full-Scale Aerodynamic Complex, (B-1)	N-251, Motor Pool, (B-2)
N-221A, 20-G Centrifuge Facility, (B-1)	N-254, Telecommunications Facility, (D-2)
N-223, Research and Development Research Support Facility, (B-1)	N-255, Facility Supply Support Center, (C-1)
N-226, 6x6-foot Supersonic Wind Tunnel, (B-1)	N-257, Crew-Vehicle Systems Research Facility, (C-1)
N-227 and N-227A-D, Unitary Plan Wind Tunnel, (B-2)	N-258, Numerical Aerodynamic Simulation Facility, (C-1)
N-229, Electric Arc Shock Tube East, (C-2)	N-260, Fluid Mechanics Laboratory, (C-2)
N-229A, 3.5-foot Hypersonic Wind Tunnel Auxiliaries, (C-2)	N-261, Biomedical Research Facility, (C-1)
N-230, Physical Sciences Research Laboratory, (C-2)	N-262, Human Performance Research Laboratory, (C-1)
N-231, N-234, N-234A, and N238, Arc Jet Complex, (C-2)	N-265, Hazardous Substances Transfer Site, (C-2)
N-233 and N-233A, Central Computer Facility, (A-1)	N-267, Disaster Area Relief Team, (D-1)
N-234, N-234A, N-231, and N238, Arc Jet Complex, (C-2)	N-269, Automation Sciences Research Facility, (C-1)
	N-271, Industrial Wastewater Pre-treatment Plant, (C-1)